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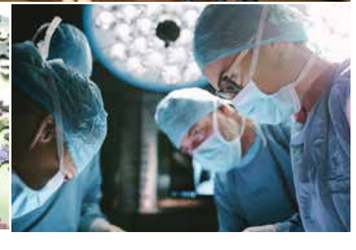

Get up to speed on how we can support your whole health.

When you or a loved one need expert neurological and neurosurgical care, it's comforting to know that AdventHealth's world-class neuro team is here with advanced capabilities in minimally invasive brain and spine surgery, a nationally ranked comprehensive program and a dedication to whole-person care.

SERVICES AND SPECIALTIES

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- Brain tumors
- Epilepsy
- Headaches and migraines
- Movement disorders
- Multiple Sclerosis
- Neuromuscular medicine
- Sleep disorders
- Spinal conditions
- Stroke and neurovascular disorders

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Updates in Neurology and Neurosurgery
AdventHealth Neuroscience Institute • Summer 2021 • Volume III, Issue I

Craig Brubaker, PhD
Vice President, AdventHealth Neuroscience Institute

AdventHealth Neuroscience Institute Aims to Become a Destination Center for Neurology and Neurosurgery

AdventHealth Neurology and Neurosurgery have been ranked in the top 50 programs nationally the last couple of years but have a vision, goal, and plan to become a national destination for patients from all over the globe.

In March 2021, construction began on AdventHealth's newest state-of-the-art health center. The 12-story building will be a major addition to the Orlando skyline and complement our quaternary campus in Health Village. In addition to other destination programs, the tower will include space for multiple Neuroscience services, including neurosurgical and subspecialty neurological brain health multidisciplinary office suites. Physicians in this space will provide care for movement disorders, neuromuscular conditions, neuroimmunology, memory care, headache/migraines and more. Patients will be able to conveniently access ancillary services in the building, including, but not limited to, imaging, rehabilitation, non-oncology infusion and ambulatory surgery as well as outreach programs with social workers, dieticians and genetic counselors. In addition, a comprehensive research department will provide easy access for patients enrolled in clinical research trials.

As discussed in the last issue, AdventHealth Neuroscience Institute is on a journey to expand neurology and neurosurgical access points for patients within our Central Florida division. Last year, our Celebration tertiary campus opened 24/7 neurosurgical and neurovascular programs as well as a multidisciplinary neurosurgical oncology clinic. A neurology office will also be opening on campus this summer to provide earlier access for general neurology and headache/migraine care. This year, our Daytona tertiary campus will be opening a 24/7 neurovascular program to complement the current neurosurgical program already in place.

We will continue serve as a differentiator in the market by offering new technologies. In Orlando this past winter, we offered our first GammaTile placement after brain tumor removal. In Celebration this spring, we will augment our Functional Neurosurgery Program by offering a national rapid-launch program for MR-guided focused ultrasound (MRgFUS) to treat patients with essential tremors that do not qualify for deep brain stimulation. In addition, this summer, we are planning to leverage AI to treat patients with large vessel occlusion in an expedited way so that no matter which campus they present to, we will be able to decrease the time to treatment.

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Christopher J. Baker, MD
Chief of Neurosurgery, AdventHealth Neuroscience Institute

AdventHealth Neuroscience Institute Continues to Expand

Welcome to another edition of the AdventHealth Neuroscience newsletter. These are exciting times in Orlando. We have broken ground on our new 100,000-square-foot neuroscience/musculoskeletal center on campus. This will enable us to promote excellent collaborative care between our neuroscience physicians and patients in a state-of-the-art environment. We are also investing heavily in updating our intraoperative CT and MRI capabilities as well as next generation spinal robotics. In addition, this summer, a number of new physicians are arriving to strengthen our neurology and neurosurgery commitment to our regional hospitals. We welcome patients in the region and throughout Florida to consider AdventHealth for their neuroscience care.

Roland Torres, MD
Neurosurgeon AdventHealth Neuroscience Institute

New Carbon Fiber Screws Used in Spinal Surgery Enhance Care for Cancer Patients

AdventHealth neurosurgeon Roland A. Torres, MD, recently performed the first spinal fusion surgery at AdventHealth using carbon fiber screws rather than metal screws. This new technology — the same used in spacecraft, military jets and Formula 1 cars — enhances post-operative follow-up care and radiation treatment for cancer patients.

Challenges with Metal Screws

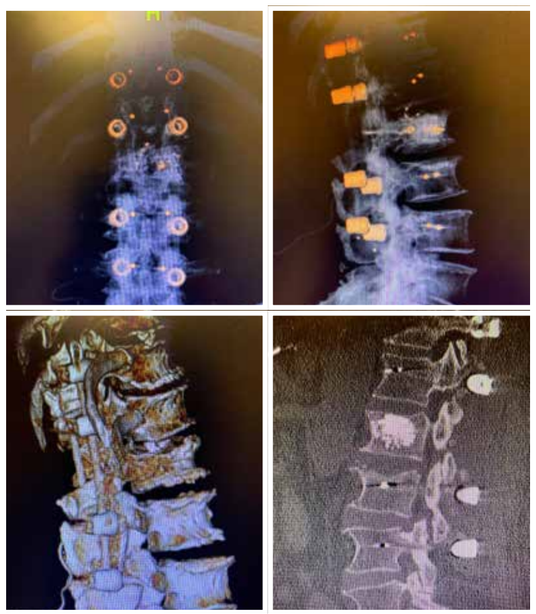
When cancer metastasizes to the spine, it can weaken it, causing pain and limiting mobility. This is often exacerbated by further spinal weakening due to radiation treatment. Spinal surgery procedures like spinal fusion can help to strengthen and stabilize the spine and have traditionally been performed using metal screws made of titanium alloys.

However, the metal screws are known to leave artifacts in X-ray, MRI and CT scans, obstructing views and creating challenges for effective radiation planning and precise dose delivery. The metal screws can also scatter radiation beams or shield the tumor from radiation. In addition, they sometimes cause irritation in surrounding tissue, nerves or the spinal cord, requiring a second surgery. All of this can negatively impact long-term cancer patient outcomes and survival.

New Carbon Fiber Technology

By contrast, the new carbon fiber screws not only provide bone-like strength and stability, they are also well tolerated. In addition, the material is practically invisible on imaging, allowing physicians to have a clear view of the treated area after surgery. This enables physicians to better monitor tumors and achieve earlier detection and treatment of any changes. Furthermore, the carbon fiber screws enhance precision, allowing radiation to better penetrate the cancer without scattering or reflecting off the metal screws and impacting healthy surrounding tissue. All of these technological improvements provide cancer patients a better chance at fighting their disease.

The new carbon fiber screws are currently approved by the Food and Drug Administration (FDA) for use only in cancer patients.



For more information or to contact the physician, please call or text our team at 727-804-2315.

Chetan K. Patel, MD
Executive Medical Director, Spine, AdventHealth Neuroscience Institute
Section Chair, Robotics & Navigation, North American Spine Society

New Evidence-based Pathway to Improve Spine Surgical Outcomes

For the past two years, the AdventHealth Neuroscience Institute has been working to enhance the value of the spine care we provide by delivering better outcomes at a lower cost. Our efforts have centered on developing new spine care pathways that have been constructed based on a thorough review of available evidence and best practices along with implementation of an extensive, ongoing process improvement infrastructure.

We began implementing our new spine surgery pathway in 2020. The foundation of this pathway is what we call our trifecta — a unified, dedicated team comprised of the surgeon, an engaged patient and a care coordinator. They work together in close partnership from the moment a patient is determined to need spine surgery, and each plays a critical role in achieving the best possible outcome.

The Role of the Surgeon

While a spine surgeon's skills, technique and experience are certainly important to achieving good outcomes, our research has determined that they alone are not enough to achieve optimum outcomes and value. They must be paired with a proper, multi-disciplinary, evidence-based approach pathway to guide patient care before and after the surgery, and the patient is a critical partner in this process.

The Role of the Patient

Through our work in developing a better spine surgery care pathway, we have identified the importance of making sure each patient is educated, engaged, optimized and a true partner. In fact, we have learned that by doing so, the patient is often our best medical assistant.

It all starts with optimization which focuses on addressing all of the modifiable risk factors that could impact a patient's surgical success. We identify these risk factors prior to surgery and proactively address them both before and after surgery to maximize outcomes. This process involves coordination with the patient's other medical providers and patient education to address risk factors such as diabetes, obesity and smoking. It is important to not just proactively educate patients, but also to engage them by helping them recognize the critical role they play both before and after surgery in achieving success. Patients are taught the importance of avoiding at-risk maneuvers while maintaining physical activity and ensuring appropriate dressing changes to enhance outcomes. Evidence shows that malnutrition is an often-underdiagnosed condition leading to poor outcomes in patients undergoing spine surgery. Therefore, we have implemented a regimen of nutritional supplements both before and after surgery to optimize surgical healing.

Finally, our goal is to provide each patient with detailed information about what to expect each step of the way, including specific signs and symptoms that could indicate a problem. This ensures that if problems do occur, we address them at an earlier stage and achieve the best results possible.

The Role of the Care Coordinator

Our spine surgical care coordinators are the glue that holds the entire pathway together. They focus on ensuring flawless execution of the plan pre-operatively, in the hospital and after discharge. They educate the patient, organize resources and troubleshoot any challenges that may arise. This includes providing pre-admission education classes for patients, specialized discharge instructions and post-discharge follow-up calls.

Ongoing Improvement

While this new approach to spine surgery was implemented at AdventHealth in 2020, we do not consider it a finished product. We are continually evaluating our cost and quality outcome metrics through spine governance and mortality/morbidity conferences, reviewing any new established evidence to determine what we can do better and refining the pathway accordingly. We remain committed to implementing the best practices to achieve the best possible outcome for our patients.

By infusing this culture of following evidence-based practices and objective self-assessment, along with our recognition of the need for an engaged patient and a care coordinator, we have seen improvements in our outcomes. As we continue our never-ending journey of self-improvement, we expect to keep delivering better and better results.

For more information or to contact the physician, please call or text our team at 727-804-2315.

AdventHealth Neuroscience Institute Welcoming New Physicians in Summer 2021

Kelvin Wilson, MD

Complex Spine Surgeon

Neurosurgeon Kelvin Wilson, MD, will come to AdventHealth Neuroscience Institute with more than 10 years of Level 1 trauma experience, including expertise in minimal access spine surgery, spinal deformity, and complex spine trauma. He also has a special interest in neuro-navigation and spinal robotics.

Dr. Wilson is currently completing his neurosurgery residency at the University of Florida and is also an active-duty Major in the United States Army Medical Corps where he serves as Director of Minimally Invasive Spine Surgery for Brooke Army Medical Center in San Antonio, Texas. Dr. Wilson earned his medical degree from James H. Quillen College of Medicine at East Tennessee State.

Jayson Lavie, MD

Endovascular Neuroradiologist

Jayson Lavie, MD, is currently completing a fellowship in endovascular surgical neuroradiology at Mallinckrodt Institute of Radiology at Washington University in St. Louis, Missouri, where he already completed a fellowship in diagnostic neuroradiology. Dr. Lavie completed both his radiology residency and internal medicine internship at Ochsner Clinic Foundation in New Orleans, Louisiana, and earned his medical degree from Lousiana State University School of Medicine. He is as a member of the Society of Neurointerventional Surgery, the American Society of Neuroradiology, and the American College of Radiology.

Melvin Field, MD
Medical Director, Minimally Invasive Brain Surgery
AdventHealth Neuroscience Institute

Imran Mohiuddin, MD
Director
CNS Radiation Oncology
AdventHealth Cancer Institute

Chandan Reddy, MD, FAANS
Neurosurgeon
Founder, Deep Brain Stimulation Program
AdventHealth Neuroscience Institute

Anwar Ahmed, MD
Director
Medical Director, Neurology
AdventHealth Cancer Institute

MR-Guided Focused Ultrasound (MRgFUS) for Essential Tremor & Tremor-dominant Parkinson's Disease

MRgFUS can help patients achieve tremor relief without the need for invasive surgery or hospitalization.

Joining the AdventHealth Neuroscience Institute group of advanced neurological and neurosurgical programs is MR-Guided Focused Ultrasound (MRgFUS) for Essential Tremor and Tremor-dominant Parkinson's Disease at AdventHealth Celebration. Essential tremor and tremor-dominant Parkinson's disease cause uncontrollable shaking that can impact a person's ability to live an independent and active lifestyle. MRgFUS is an addition to the Movement Disorder Program and can help patients achieve tremor relief without the need for invasive surgery or hospitalization. AdventHealth Celebration will be the first location in Central Florida for MRgFUS. In addition, AdventHealth is the only location in Florida that has contracted with Insightec, the device manufacturer, to provide assistance to patients with initial screening, meeting the AdventHealth treatment team, scheduling a CT scan and coordinating the Neuravive treatment.

More about the Treatment:

MRgFUS is incision-less surgery where up to 1,024 ultrasound waves pass safely through the skull and brain tissue to precisely heat and ablate a deep brain target while MR imaging allows for treatment monitoring. MRgFUS may be an option for essential tremor and tremor-dominant Parkinson's disease patients who do not respond to medications. The treatment is safe and effective, has minimal side effects and takes only 2.5 hours to complete, including patient prep and scan. The benefits of MRgFUS include no incision, immediate tremor improvement for most patients and a personalized plan delivered in a single session treatment.

To refer a patient, please call 800-662-0196, email AdventHealthTremorRelief@Insightec.com or visit TremorRelief.com.

AdventHealth is First in Central Florida to Perform Innovative Procedure for Patients with Aggressive Brain Tumors

AdventHealth Orlando became the first site in Central Florida to utilize GammaTile brachytherapy for the treatment of a metastatic brain lesion. Melvin Field, MD, Medical Director of AdventHealth's Minimally Invasive Brain Surgery program and Co-Director of the Neuro-Oncology program, worked in partnership with Imran Mohiuddin, MD, Director of CNS Radiation Oncology for AdventHealth Cancer Institute, to utilize this breakthrough technology.

Each individual GammaTile comprises a 2 cm x 2 cm x 4 mm collagen matrix embedded with Cesium-131 radioactive seeds. An appropriate number of tiles (pre-determined based on anticipated surgical cavity size) are used to line the tumor bed after the tumor is maximally resected. GammaTiles begin killing cancer cells right away through emission of radiation. Each tile lasts for approximately six weeks before the biodegradable collagen matrix is naturally absorbed into the body, leaving behind only biologically inert seeds that are no longer radioactive. From the patient's perspective, there is no apparent change in their length of hospital stay or outpatient surveillance.

Using this strategy, a therapeutic dose of 60 Gy is precisely delivered to the tumor bed and immediately starts treating any potential microscopic residual disease. By comparison, the workflow for conventional external beam/tele-radiotherapy would necessitate a requisite amount of healing time prior to adjuvant radiotherapy (i.e., giving residual disease time to regrow and spread). Also, since the GammaTile brachytherapy radiation dose only penetrates to 5 mm tissue depth, radiation dosing can still be very high with minimal risk to adjacent sensitive structures or previously irradiated tissues.

"We are limited with what we can do for certain brain cancers and even for some non-cancerous brain tumors," said Dr. Field. "GammaTile gives us yet another tool to fight cancer on behalf of our patients and their families."

Dr Mohiuddin said, "GammaTile is uniquely helpful because it begins working immediately after placement into the brain. The patient does not have to wait to heal from surgery before beginning the next phase of treatment, which means the cancer has less time to regrow before starting radiation."

"It is very focal," Mohiuddin said. "We can do an excellent job of giving a very high dose of radiation to only the problem areas while sparing healthy brain tissue that is even millimeters away. In general, these features translate to higher rates of cure while also sparing patients from difficult side effects of treatment, such as brain damage or hair loss."

GammaTile, which was approved by the FDA less than two years ago, can be used as a first- or second-line treatment for intracranial tumors. Dr Field and Dr Mohiuddin have already successfully performed two GammaTile cases for patients with brain tumors which had continued to grow in spite of previous conventional therapy.

For more information or to contact the physician, please call or text our team at 727-804-2315.

Neuromodulation in Headache Medicine

Bernadette Nazario-Lopez, MD, PharmD
Headache Medicine Medical Director-
AdventHealth Neuroscience Institute

In the past few years, headache medicine has been evolving, and we can now offer our patients new strategies. In 2018, the FDA approved the first class of medications exclusively indicated for migraine prevention, CGRP monoclonal antibodies. Last year, the FDA approved three new acute migraine medications and an IV infusion for prevention of migraine. In addition, we now have noninvasive tools that involve neuromodulation. These tools are not considered the first line of treatment for headaches but may help in certain patient populations, especially when pharmacologic strategies are not feasible or when trying to reduce the risk of medication overuse headache. Neuromodulation involves modifying the neuronal activity in pain mechanisms involved in headaches. These devices do so via electrical currents or magnets. Currently, there are four FDA-approved neuromodulator devices available.

Single-pulse Transcranial Magnetic Stimulator (sTMS) (eNeura®)

sTMS is indicated for acute and preventive treatment of migraine headaches in patients ≥ 12 years old. Its mechanism of action is thought to be to decrease the cortical excitability involved in the activation of cortical spread depression. It may also modulate the thalamic nociceptive circuit activity via downregulation of the thalamocortical neurons. This device is usually placed on the back of the head to deliver sTMS.

The most common side effects associated with sTMS include scalp discomfort, tingling, lightheadedness, dizziness, tinnitus, worsening headaches and discomfort from noise. Patients that have scalp allodynia may not be good candidates for this device.

Not all patients will benefit from sTMS. There are certain contraindications and precautions when using this device. These include the following:

- Patient shall stay at least 2 feet from others when using device.
- It should not be used along insulin pumps, other medical pumps, bone growth stimulators, TENS units and hearing aids. Patient shall remove these prior to using a sTMS device.
- Do not use in patients with wearable cardioverter defibrillator.
- Do not use in patients with history or suspected epilepsy.
- Do not use in patients with prior history of stroke.
- Use caution in patients with suspected or diagnosed heart problems

External Trigeminal Nerve Stimulation Device (e-TNS) (Cefaly®)

The e-TNS device stimulates the bilateral supratrochlear and supraorbital nerves. It is indicated for the acute treatment of migraines with or without aura in patients 18 years of age or older. It is also indicated for the preventive treatment of episodic migraines in patients 18 years of age or older. Since October 2020, the Cefaly Dual device is available over the counter in the United States. This device has two settings, one for acute and another for preventing migraines. It is usually placed with one electrode on the forehead.

The most common side effects are minor and may include paresthesia and sleep-wake disturbances. Sometimes patients may have redness under the area of the electrode and on rare occasions may report nausea. It is contraindicated in the following patients:

- Have implanted metallic or electronic devices in head
- History of cardiac pacemaker or implanted/wearable defibrillator
- Open wounds and over swollen, infected, or inflamed area on the forehead, where the device is typically placed

Noninvasive Vagus Nerve Stimulator (nVNS) (gammaCoreTM)

The nVNS device mechanism of action in headaches remains unclear. It appears to act on central pain centers via the nucleus tractus solitarius and input from the vagus nerve. In animal studies, it has been shown that stimulating the vagus nerve may suppress glutamate increase in the nucleus of the trigeminal nerve and may also reduce the cortical spread depression seen in migraines. Patients place the device superficially on the neck where the vagus nerve runs its course to provide mild stimulation.

Contrary to the prior neurostimulator devices discussed here, the nVNS device, gammaCoreTM, is indicated not only for the prevention and acute treatment of migraines, but it is also indicated for the prevention and acute treatment of episodic cluster headaches. It may be used in migraine patients 12 years of age or older and only in adult patients with episodic cluster headaches.

The most common side effects associated with nVNS include application site discomfort, application site irritation, local pain (e.g., face, head, neck area), local muscle twitching/contractions (e.g., face, head, neck area), dizziness, and paresthesia. The following patients shall not use nVNS:

- Have active implantable medical device such as pacemaker, hearing aid implant or any other electronic device
- Have metallic device such as a stent, bone plate or bone screw implanted at or near the neck
- Are using another device at the same time (e.g., TENS unit) or any portable electronic device (e.g., mobile phone)
- Open wound, rash, infection, swelling, cut, sore, drug patch or surgical scar on the neck at the treatment location

Remote Electrical Neuromodulation (REN) (Nerivio®)

REN generates nonpainful stimulus in the upper area of the arm for 45 minutes to activate the inhibitory pain pathways. This is done via conditioned pain modulation, exerting a generalized analgesic effect. Nerivio® is indicated for the acute treatment of migraines in patients 12 years of age and older. The electrodes of REN are placed on the upper arm via a band, regardless of side of headache. Patients use the device along with a smartphone to activate nonpainful stimulus.

The most common side effects with REN include local tingling/numbness in the arm where band is located, temporary sensation of warmth, pain in the arm and redness in the skin. Contraindications to Nerivio® include:

- Patients with congestive heart failure
- Patients with severe cardiac or cerebrovascular disease
- Patients with uncontrolled epilepsy
- Active implantable medical devices such as pacemaker, defibrillator or hearing aid implant

Conclusion

Neuromodulation devices can be excellent choices in certain patients with cluster or migraine headaches that are affecting their quality of life. Patients who may benefit from these alternatives include those that have contraindications to or experience poor tolerance or inadequate response to specific pharmacologic alternatives. Neuromodulation may also be an appropriate alternative in patients that have a history of overuse of acute medications for headaches. Finally, it may be an appropriate treatment for patients that prefer the nonpharmacologic route. There may be a factor of accessibility when it comes to cost, but certain medical insurances are already approving some of these devices. It is important to mention that most of the companies of these neuromodulators may have savings or patient assistance programs that may help patients gain access to them.

For more information or to contact the physician, please call or text our team at 727-804-2315.

Ravi Gandhi, MD
Neurovascular Medical Director
AdventHealth Neuroscience Institute

Minimally Invasive Alternative to Open Surgery for Subdural Hematomas

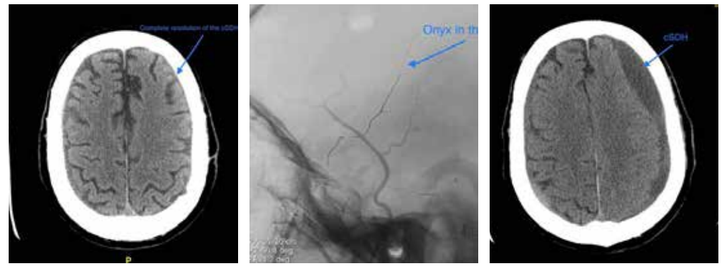
The endovascular neurosurgery team continues to find innovative ways to treat neurological problems. Chronic subdural hematoma (cSDH) or nonacute subdural hematoma (NASH) is a neurosurgical diagnosis that plagues the elderly population and is estimated to affect 20 out of every 100,000 people in the United States. The prevalence of elderly patients in Central Florida makes this a particularly common diagnosis within the AdventHealth system. Open surgical management is associated with recurrence and exposes elderly patients to perioperative and operative risks. This risk is even higher in patients on antiplatelet medications or anticoagulation. Middle meningeal artery (MMA) embolization is a minimally invasive, less morbid treatment option for these patients and can be used without significant risk on patients treated with antiplatelet or anticoagulation. It can be applied for patients as an upfront therapy, after a recurrence, or as an adjunct to surgery.

cSDHs have a tendency to persist and gradually increase over time, which is thought to be related to inflammation and angiogenesis. After the initial hemorrhage, the fibrinolysis stimulates inflammation and subsequent angiogenesis. This process leads to “leaky” blood vessels and subsequent microhemorrhages, which create a vicious loop.

The technique applied uses a typical trans-femoral approach and endovascular access to the MMA. Once the microcatheter is within the MMA, N-butyl cyanoacrylate (NBCA) or Onyx™ liquid embolic system (LES) is injected until the MMA is occluded. The interventionalist prudently observes for expected anastomosis with the intracranial circulation or the ophthalmic artery to prevent complication.

There have been a number of case series and meta-analysis that support MMA embolization as a favorable treatment option for cSDHs and NASH. The literature has demonstrated, in retrospective studies and case series, a significant benefit of MMA embolization of hematoma stability and reabsorption compared to observation or surgical evacuation. There are two ongoing randomized control trials (RCTs) at this time, and AdventHealth will be participating in one of them.

MMA embolization has been performed successfully on over 30 patients at AdventHealth. The introduction of this treatment modality for cSDH has proven an invaluable tool to treat these patients. Many have been able to leave the hospital one day after the intervention. The number of patients treated with this minimally invasive technique will continue to grow.



For more information or to contact the physician, please call or text our team at 727-804-2315.

Care Navigation

Minimally Invasive Brain Surgery (MIBS)	407-303-7944	Parkinson’s Outreach Center	407-303-5295
Spine Center	407-303-9102	Alzheimer’s Disease & Dementia	407-392-9237
Epilepsy & MEG	407-303-7520	Normal Pressure Hydrocephalus	407-303-3282
Center for Sleep Disorders	407-303-1994		